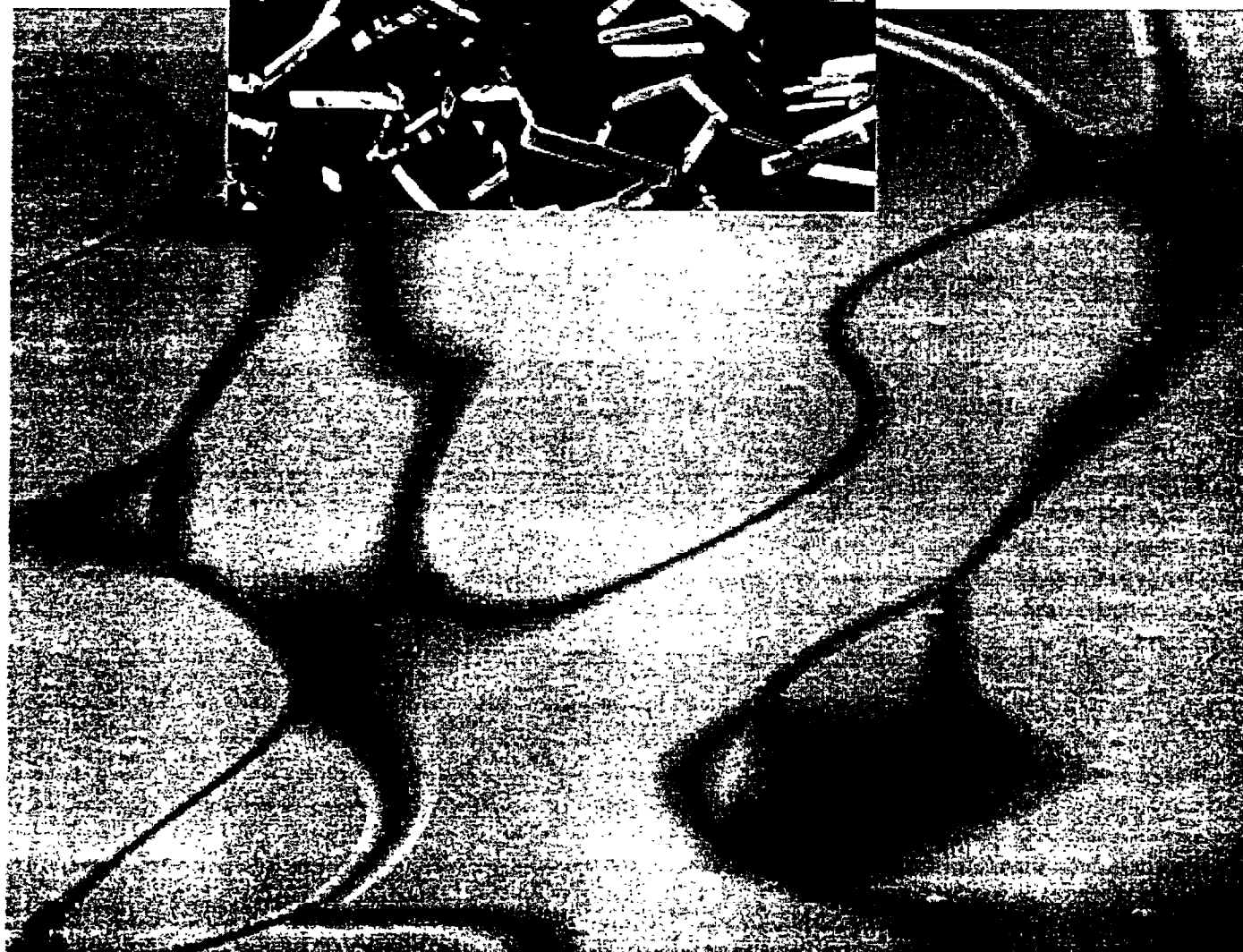
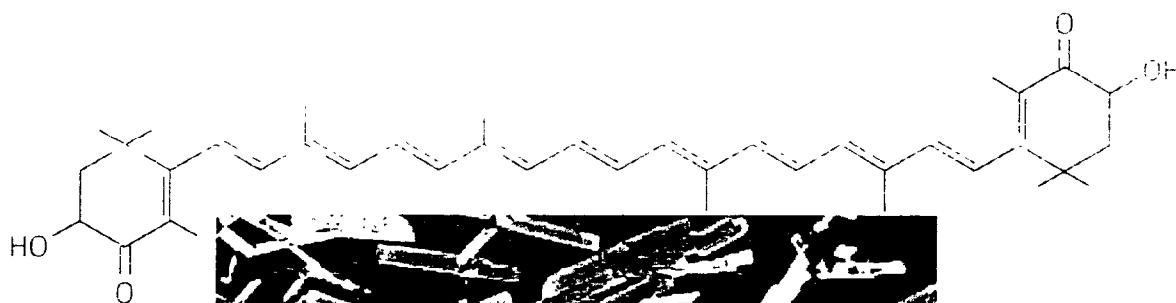


CAROPHYLL[®] Pink

Nature identical astaxanthin for aquaculture



CAROPHYLL® Pink

Active ingredient astaxanthin

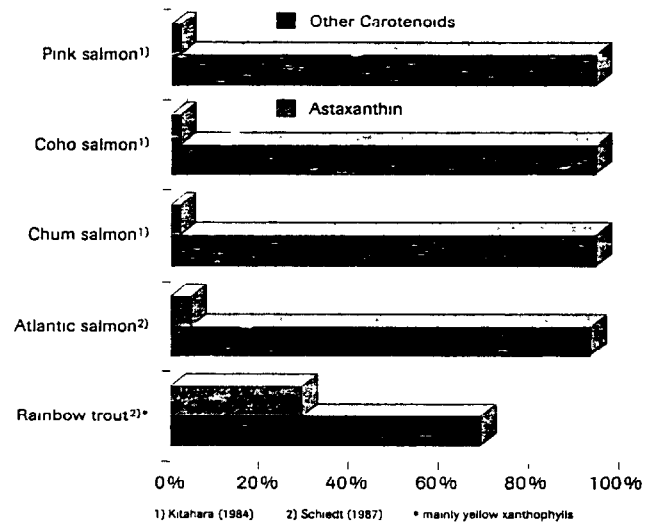
Natural pigment

Astaxanthin is the major carotenoid responsible for the pink-red pigmentation of fish and shrimps.

Aquatic animals cannot synthesise astaxanthin and therefore it must be supplemented in the diet.

As well as being a pigment astaxanthin has been shown to have other biological and nutritional functions, linked to its ability to act as a powerful antioxidant.

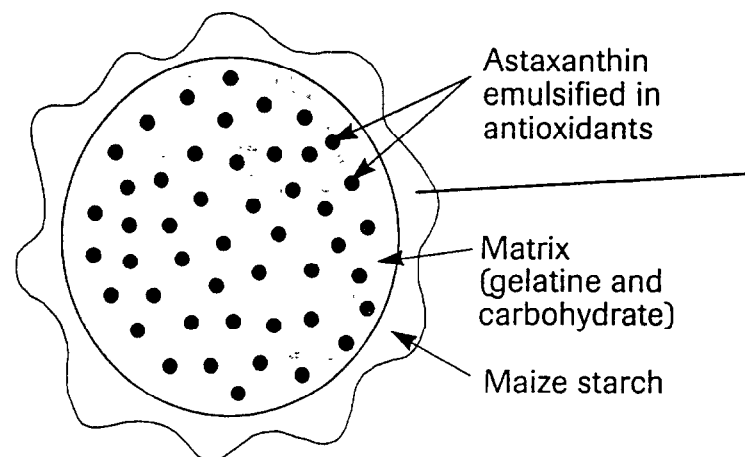
Astaxanthin is the main carotenoid of 'wild' salmonids



An outstanding formulation

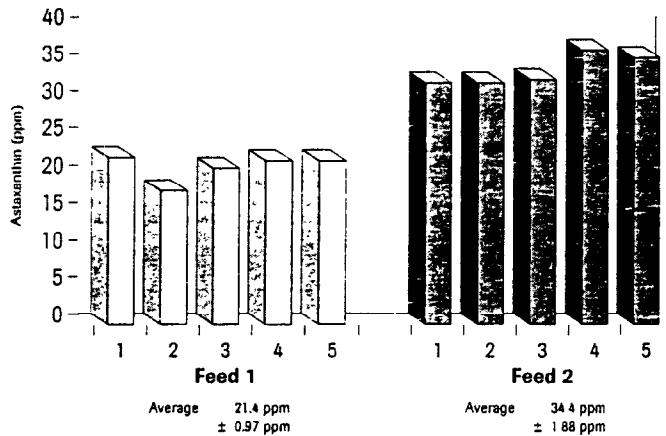
CAROPHYLL® Pink is a formulated product that provides the feed manufacturer with a stable and reliable source of nature identical astaxanthin. This product has been designed and formulated for addition pre-extrusion. It is clearly defined and consistent.

Structure and composition of a CAROPHYLL® Pink beadlet



CAROPHYLL® Pink

Homogeneity test results of CAROPHYLL® Pink in mash fish feed



Roche Basel, unpublished result

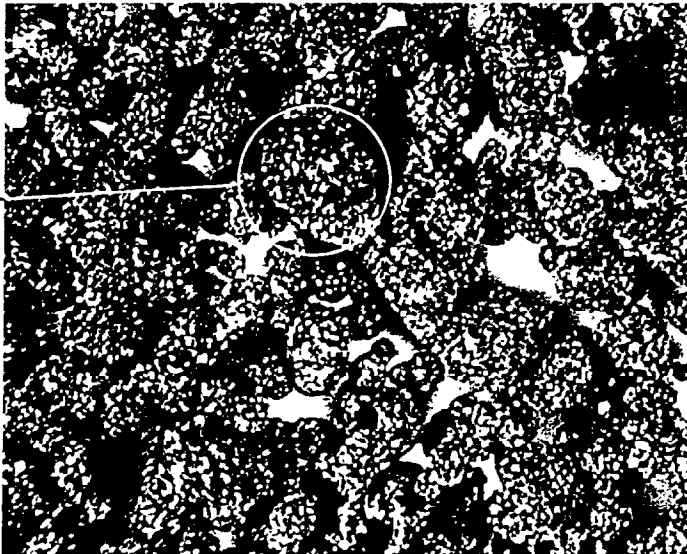
Handling and Miscibility

The starch-coated beadlet has a particle size and density that provides a free-flowing powder.

Such a free flowing powder can be used with confidence in a variety of micro-ingredient addition systems. The particle shape, size and particle numbers of this product are designed to give excellent miscibility thus achieving uniform distribution throughout the manufactured fish feed.

The low dust level in this product aids handling and reduces waste and environmental pollution.

CAROPHYLL® Pink – beadlet appearance

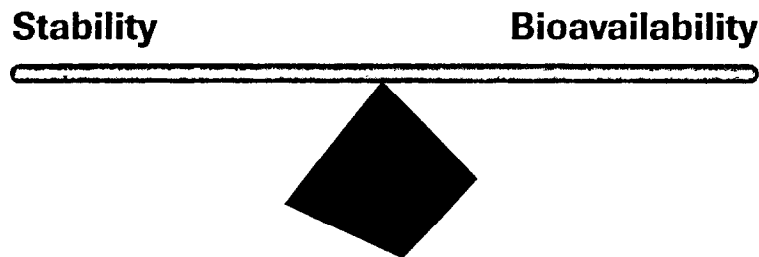


CAROPHYLL® Pink

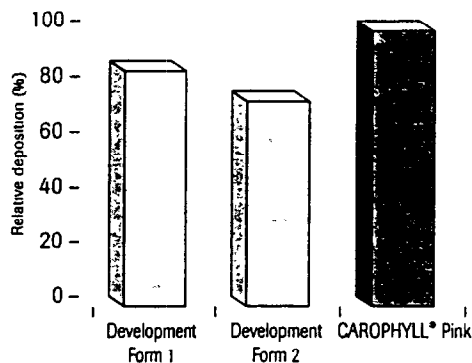
Stability

Stability is linked to bioavailability – there is a trade off between these two factors. In CAROPHYLL® Pink the sensitive astaxanthin molecules are stabilised with antioxidants and embedded in a carbohydrate and gelatine matrix. This stable product is coated with starch to improve handling.

During the manufacture of fish feed astaxanthin is liberated from CAROPHYLL® Pink. This is a necessary step to increase the bioavailability of the previously encapsulated astaxanthin. The fish feed production process may lead to some astaxanthin losses both at manufacture and subsequently during storage of the fish feed.



Relative deposition rate of astaxanthin forms in salmonid flesh (%)



Bioavailability

Bioavailability is defined as retention in fish flesh. Many scientific studies have shown that CAROPHYLL® Pink added pre-extrusion ensures optimum astaxanthin bioavailability. Furthermore, these studies have also demonstrated that the nature identical, free form, of astaxanthin derived from CAROPHYLL® Pink results in the highest deposition efficiency in farmed fish and shrimp.

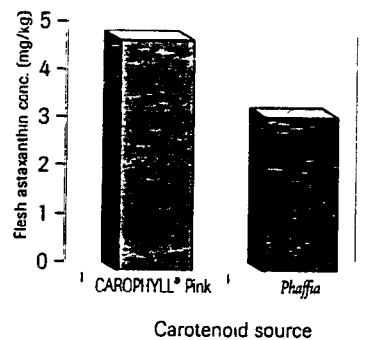
CAROPHYLL® Pink

Bioavailability

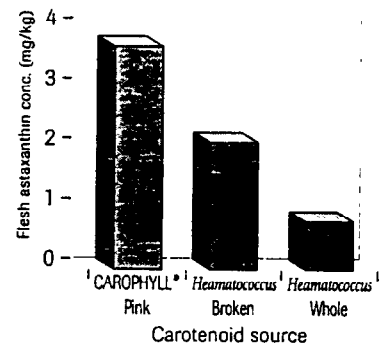
Bioavailability of CAROPHYLL® Pink astaxanthin compared to:

a) *Phaffia* astaxanthin

b) broken or whole *Haematococcus* ce

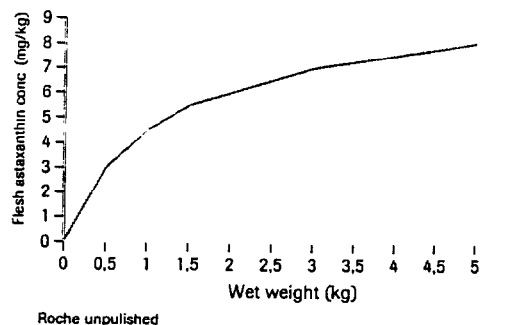


N.B. Both diets contained 100 ppm of astaxanthin
(Choubert *et al.*, 1995)



(Sommer *et al.*, 1991)

An atlantic salmon flesh astaxanthin deposition model



Roche unpublished

Ecological Credentials

CAROPHYLL® Pink contains nature identical astaxanthin. The product is biodegradable and is not expected to result in any persisting environmental influence. It is produced intensively

with a carefully documented low environmental impact. The product is an approved feed ingredient in all the major aquaculture countries in the world.

CAROPHYLL® Pink

The proven source of astaxanthin for aquaculture



Technical characteristics of CAROPHYLL® Pink

Content	min. 8 % astaxanthin
Chemical name	3,3'-dihydroxy- β,β -carotene-4,4'-dione
Chemical formula	$C_{40}H_{53}O_4$
Molecular weight	596.85
Colour	Violet-brown – violet-red
Bulk/tapped density	0.56–0.65 kg/litre
Flow	ca. 6 sec per 100 g
Particle size	100 % < 850 μm 90 % < 425 μm 15 % < 150 μm
Taste	Slightly sweet
Smell	No detectable odour
Particle number	ca. 100 000/g
Solubility	Disperses in water at ca. 50 °C or above. It does not form a true solution.
Shelf life	The shelf life is 36 months from the date of manufacture when stored in the unopened original packaging at a temperature below 15 °C

CAROPHYLL® PINK is a product made by F. Hoffmann-La Roche Ltd and has been certified by AFAQ (1993/1015) under the standard ISO 9002.

For more detailed information about the use of CAROPHYLL® products, please contact your local Roche affiliate.

F. Hoffmann-La Roche Ltd · CH-4070 Basel · Fax ++41/61/688 15 92 · <http://www.roche.com>

CAROPHYLL® Pink

Product identification

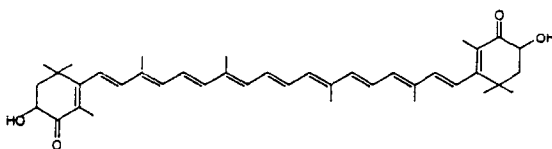
Astaxanthin

Product code: 04 1212 0

Description

CAROPHYLL Pink is a violet-brown to violet-red, free-flowing powder. The individual particles contain astaxanthin in a starch-coated matrix of gelatin and carbohydrates. Ethoxyquin and ascorbyl palmitate are added as antioxidants.

Chemical structure



C₄₀H₅₂O₄

M_r 596.85

CAS No.: 7542-45-2

EINECS: 231-424-6

Chemical names: 3',3'-dihydroxy-4,4'-diketo-β-carotene; 3,3'-dihydroxy-β,β-carotene-4,4'-dione; 3,3'-dihydroxy-[all-*trans*-1,18-(3,7,12,16-tetramethyl-1,3,5,7,9,11,13,15,17-octadecanonaen-1,18-diyl)-bis-(2,6,6-trimethylcyclohexen)]-4,4'-dione (3*S*,3'*S*:3*R*,3'*R*:3*R*,3'*S* = 1:1:2)

Specifications

Appearance: violet-brown to violet-red, free-flowing powder

Fineness (US standard sieves):

100% through sieve No. 20

min. 90% through sieve No. 40

max. 15% through sieve No. 100

Loss on drying: max. 8%

Astaxanthin content: min. 8%

Stability and storage

CAROPHYLL Pink is sensitive to air, heat, light and humidity. The product may be stored for 36 months from the date of manufacture in the unopened original container and at a temperature below 15 °C. The 'best used before' date is printed on the label. Keep container tightly closed. Once opened, use contents quickly.

Uses

As a feed additive for the pigmentation of aquatic animals.

Regulatory status

Generally approved for the intended use.

Safety

This product is safe for the intended use.

Avoid ingestion, inhalation of dust or direct contact by applying suitable protective measures and personal hygiene.

For full safety information and necessary precautions, please refer to the respective Roche Safety Data Sheet.

